

MR1679-259

Serial Number: 10/718,673

Reply to Office Action dated 15 December 2005

REMARKS/ARGUMENTS

This case has been carefully reviewed and analyzed in view of the Office Action dated 15 December 2005. Responsive to the rejections made in the Official Action, Claim 1 has been amended to clarify the combination of elements which form the invention of the subject Patent Application and Claim 6 has been canceled by this Amendment.

In the Official Action, the Examiner rejected Claims 1-3 under 35 U.S.C. § 103(a), as being unpatentable over Hsin, U.S. Patent Application Publication 2003/0062873, in view of Chen, U.S. Patent 5,847,545. Claim 4 was rejected under 35 U.S.C. § 103(a), as being unpatentable over Hsin in view of Chen '545 and further in view of Chen, U.S. Patent 5,839,919. Claim 5 was rejected under 35 U.S.C. § 103(a), as being unpatentable over Hsin in view of Chen '545, and further in view of Bushong, U.S. Patent 5,686,811. Lastly, Claim 6 was rejected under 35 U.S.C. § 103(a), as being unpatentable over Hsin in view of Chen '545, and further in view of Matsuura, U.S. Patent 6,094,034.

Before discussing the prior art relied upon by the Examiner, it is believed beneficial to first briefly review the structure of the invention of the subject Patent Application, as now claimed. The invention of the subject Patent Application is directed to an integrated charger for use in a car. The charge includes a charging seat having a charging groove for receiving and charging dry batteries. The charging seat includes a DC-DC converter and a charging control circuit. The

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charging control circuit includes a pulse width modulation (PWM) control switch having an input coupled to an output of the DC-DC converter, a microprocessor having an output coupled to the PWM control switch, a voltage detection circuit having an output coupled to the microprocessor, and a current detection circuit having an output coupled to the microprocessor. Responsive to voltage and current detection of the batteries received within the charging groove, the microprocessor controls the pulse width modulation control switch for switching the power supplied from the DC-DC converter to the batteries, controlling the voltage and current supply to the batteries as they are charged. The integrated charger includes a power supply head formed in a cylindrical shape and adapted to a cigarette lighter socket in the car for insertion thereinto to lead the power source into the charging seat. The power supply head and the charging seat are integrated in a body in such a manner that the power cords embedded within the power supply head create an electrical connection with the DC/DC converter.

It is respectfully submitted that the Hsin reference is directed to a fast combinational charger and the Chen '545 reference is directed to a dual A/C and D/C input powered portable battery charger. As admitted by the Examiner, neither Hsin nor Chen '545 disclose a charger including a pulse width modulation (PWM) control switch, a microprocessor, a voltage detection circuit and a current detection circuit wherein, responsive to voltage and current detection of the batteries received within the charging groove, the microprocessor controls the

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pulse width modulation control switch for switching the power supplied from the DC/DC converter to the batteries, controlling the voltage and current supplied to the batteries as they are charged.

The Matsuura reference does not overcome the deficiencies of Hsin combined with Chen '545. The Matsuura reference is directed to a method of charging a secondary battery and apparatus for the same. The DC voltage is supplied to a DC/DC converter 30 which supplies power to batteries being charged. A control circuit 38 includes a current sensing section 390 which includes an analog to digital converter for digitizing the sensed charged current, which drives a charge stop switch to turn off the charging under such circumstances. A voltage sensing section 392 is provided to sense the secondary battery voltage. Once charging has commenced, the control circuit 38 operates the charge switching circuit 32 to operate at a fixed duty cycle, 90% on time and 10% off time, until the batteries are charged, at which time charging is stopped.

Nowhere does the reference disclose or suggest operating the charge switching circuit as a pulse width modulation, modulating the pulse duty cycle for controlling the voltage and current supply to the batteries as they are charged, as now claimed. The reference system simply provides a pulse charging at a fixed duty cycle until the batteries are sensed to be fully charged, at which time charging is terminated. Whereas, in the invention of the subject Patent Application, a closed loop control methodology is utilized, wherein the pulse width modulation

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control switch is continually controlled to maintain a desired charging voltage and current at the batteries. Such an arrangement is critical for the charging of Li-ion type batteries, which can spontaneously ignite if exposed to an overcurrent condition.

As none of Hsin, Chen '545 or Matsuura disclose or suggest the concatenation of elements which form the invention of the subject Patent Application, they cannot make obvious that invention.

For all of the foregoing reasons, it is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,
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